

CLAIM AMENDMENTS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1 1. (Original) A method for a wide-area file system, including a plurality of replicas for a  
2 file, wherein each replica of the file and parent directories for the file are at each of a  
3 plurality of nodes, the method comprising:  
4 propagating an update to a replica of the file to other replicas of the file; and  
5 in response receiving a propagated update to a replica at a node, updating the  
6 replica for the file at the node.

1 2. (Original) The method according to claim 1, wherein each replica has a backpointer  
2 including an identification of a parent directory for the file and a name of the file in the  
3 parent directory.

1 3. (Original) The method according to claim 2, wherein the parent directories are  
2 modified when the backpointer for a replica at a node is not consistent with the parent  
3 directories for the replica at the node.

1 4. (Original) The method according to claim 3, wherein modifying the parent directories  
2 occurs only after a delay.

1 5. (Original) The method according to claim 3, wherein multiple modifications to the  
2 parent directories at the node are performed according to an order in which corresponding  
3 updates occur.

1 6. (Original) The method according to claim 3, wherein a modification is performed at  
2 the node and an earlier inconsistent modification is ignored.

1 7. (Original) The method according to claim 2, wherein a directory operation affects the  
2 backpointer for the file.

1 8. (Original) The method according to claim 7, wherein the directory operation is  
2 selected from a group consisting of rename, link and unlink.

1 9. (Original) The method according to claim 8, wherein when the backpointer for a  
2 replica at a node is not consistent with the parent directories for the replica at the node,  
3 further comprising modifying the parent directories to be consistent with the backpointer.

1 10. (Original) The method according to claim 1, wherein the replicas include replicas of  
2 a first type and of a second type wherein locations of replicas of the first type are  
3 registered in a parent directory for a file.

1 11. (Currently Amended) The method according to claim 1, wherein the replicas include  
2 replicas of a first type and of a second type and wherein in response to a user accessing a  
3 file at a node, the method further comprises steps of replicating the parent directory for  
4 the file at the node and forming a replica of the second type at the node.

1 12. (Original) The method according to claim 11, wherein a minimum number of  
2 replicas of the first type are maintained according to a minimum replication factor for the  
3 corresponding file.

1 13. (Original) The method according to claim 1, wherein a replica is deleted by marking  
2 the replica as invalid.

1 14. (Original) The method according to claim 13, wherein said marking the replica as  
2 invalid comprises removing the backpointer for the replica.

1 15. (Original) The method according to claim 13, further comprising periodically  
2 removing replicas marked as invalid.

1 16. (Currently Amended) A method for a wide-area file system, including a plurality of  
2 replicas for a file, and wherein upon access of the file by a user at a node, the method  
3 comprises steps of:

4 replicating parent directories for the file at the node; and  
5 forming a replica of the file at the node wherein the replica includes a  
6 backpointer, and the backpointer includes~~having~~ an identification of a parent directory for  
7 the file and a name of the file within the parent directory.

1 17. (Original) The method according to claim 16, further comprising propagating an  
2 update to a replica of the file to other replicas of the file.

1 18. (Original) The method according to claim 17, wherein the update is forwarded  
2 according to a graph for the file.

1 19. (Original) The method according to claim 17, wherein in response receiving a  
2 propagated update to a replica at a node, the node updates parent directories for the file at  
3 the node.

1 20. (Original) The method according to claim 17, wherein when a backpointer for a  
2 replica at a node is not consistent with parent directories for the replica at the node, the  
3 method further comprises modifying the parent directories to be consistent with the  
4 backpointer.

1 21. (Original) The method according to claim 20, wherein said modifying is performed  
2 only after a delay.

1 22. (Original) The method according to claim 20, wherein multiple modifications to the  
2 parent directories at the node are performed according to an order in which corresponding  
3 updates occur.

1 23. (Original) The method according to claim 20, wherein a modification is performed  
2 at the node and an earlier inconsistent modification is ignored.

1 24. (Original) The method according to claim 17, wherein a directory operation affects  
2 the backpointer for the file.

1 25. (Original) The method according to claim 24, wherein the directory operation is  
2 selected from a group consisting of rename, link and unlink.

1 26. (Original) The method according to claim 24, wherein when the backpointer for a  
2 replica at a node is not consistent with parent directories for the replica at the node, the  
3 method further comprises modifying the parent directories to be consistent with the  
4 backpointer.

1 27. (Original) The method according to claim 16, wherein a minimum number of  
2 replicas for a file are maintained according to a minimum replication factor for the file.

1 28. (Original) The method according to claim 27, wherein links between replicas of a  
2 file form a graph for the file and wherein updates to the file are propagated along the  
3 graph.

1 29. (Original) The method according to claim 16, wherein a replica is deleted by  
2 marking the replica as invalid.

1 30. (Original) The method according to claim 29, wherein said marking the replica as  
2 invalid comprises removing the backpointer for the replica.

1 31. (Original) The method according to claim 29, further comprising periodically  
2 removing replicas marked as invalid.

1 32. (Original) The method according to claim 16, further comprising locating a parent  
2 directory of the file.

1 33. (Original) The method according to claim 32, wherein said replicating the parent  
2 directories comprises copying contents of the parent directory located by said locating.

1 34. (Original) The method according to claim 33, wherein said locating and copying are  
2 performed recursively, thereby traversing a pathname for the file.

1 35. (Original) The method according to claim 33, wherein said forming the replica of  
2 the file comprises a copying contents of a replica of the file located by said locating.

1 36. (Currently Amended) A method for a wide-area file system including a first type of  
2 file replica and a second type of file replica wherein locations of replicas of the first type  
3 are registered in a parent directory for a file, and wherein upon access of a file by a user  
4 at a node, the method comprises steps of:  
5 replicating the parent directory for the file at the node; and  
6 forming a replica of the second type at the node wherein the replica of the second  
7 type includes a backpointer, and the backpointer includes~~having~~ an identification of the  
8 parent directory for the file and a name of the file within the parent directory.

1 37. (Original) The method according to claim 36, further comprising propagating an  
2 update to a replica of the file to other replicas of the file.

1 38. (Original) The method according to claim 37, wherein the update is forwarded  
2 according to a graph for the file.

1 39. (Original) The method according to claim 37, wherein in response receiving a  
2 propagated update to a replica at a node, the node updates parent directories for the file at  
3 the node.

1 40. (Original) The method according to claim 37, wherein when a backpointer for a  
2 replica at a node is not consistent with parent directories for the replica at the node, the  
3 method further comprises modifying the parent directories to be consistent with the  
4 backpointer.

1 41. (Original) The method according to claim 40, wherein said modifying is performed  
2 only after a delay.

1 42. (Original) The method according to claim 40, wherein multiple modifications to the  
2 parent directories at the node are performed according to an order in which corresponding  
3 updates occur.

1 43. (Original) The method according to claim 40, wherein a modification is performed  
2 at the node and an earlier inconsistent modification is ignored.

1 44. (Original) The method according to claim 37, wherein a directory operation is  
2 performed on the backpointer for the file.

1 45. (Original) The method according to claim 44, wherein the directory operation is  
2 selected from the group consisting of rename, link and unlink.

1 46. (Original) The method according to claim 44, wherein when the backpointer for a  
2 replica at a node is not consistent with parent directories for the replica at the node, the  
3 method further comprises modifying the parent directories to be consistent with the  
4 backpointer.

1 47. (Original) The method according to claim 36, wherein a minimum number of  
2 replicas of the first type are maintained according to a minimum replication factor for the  
3 corresponding file.

1 48. (Original) The method according to claim 47, wherein links between replicas of a  
2 file form a graph for the file and wherein updates to the file are propagated along the  
3 graph.

1 49. (Original) The method according to claim 36, wherein a replica is deleted by  
2 marking the replica as invalid.

1 50. (Original) The method according to claim 49, wherein said marking the replica as  
2 invalid comprises removing the backpointer for the replica.

1 51. (Original) The method according to claim 49, further comprising periodically  
2 removing replicas marked as invalid.

1 52. (Original) The method according to claim 36, further comprising locating a parent  
2 directory of the file.

1 53. (Original) The method according to claim 52, wherein said replicating the parent  
2 directories comprises copying contents of the parent directory located by said locating.

1 54. (Original) The method according to claim 53, wherein said locating and copying are  
2 performed recursively, thereby traversing a pathname for the file.

1 55. (Original) The method according to claim 53, wherein said forming the replica of  
2 the file comprises a copying contents of a replica of the file located by said locating.

1 56. (Currently Amended) A system including:  
2 a plurality of nodes that store~~for storing~~ replicas of files,  
3 wherein for each replica at a node, the node stores parent directories for the file  
4 and a backpointer having an identification of a parent directory for the file, and  
5 wherein the nodes are configured to propagate updates to replicas of each~~the~~ file  
6 ~~are propagated~~ to other replicas of the file.

1 57. (Original) The system according to claim 56, wherein in response to receiving a  
2 propagated update to a replica at a node, the node updates the parent directories for the  
3 file at the node.

1 58. (Original) The system according to claim 56, wherein when a backpointer for a  
2 replica at a node is not consistent with the parent directories for the replica at the node,  
3 the node modifies the parent directories to be consistent with the backpointer.

1 59. (Original) The system according to claim 58, wherein the node modifies the parent  
2 directories to be consistent with the backpointer only after a delay.

1 60. (Original) The method according to claim 58, wherein multiple modifications to the  
2 parent directories at the node are performed according to an order in which corresponding  
3 updates occur.

1 61. (Original) The method according to claim 58, wherein a modification is performed  
2 at the node and an earlier inconsistent modification is ignored.

1 62. (Original) The method according to claim 56, wherein a directory operation is  
2 affects the backpointer for the file.

1 63. (Original) The method according to claim 62, wherein the directory operation is  
2 selected from a group consisting of rename, link and unlink.

1 64. (Original) The method according to claim 62, wherein when a backpointer for a  
2 replica at a node is not consistent with the parent directories for the replica at the node,  
3 the node modifies the parent directories to be consistent with the backpointer.



1 65. (Original) The system according to claim 56, wherein the replicas include replicas of  
2 a first type and of a second type wherein locations of replicas of the first type are  
3 registered in a parent directory for a file.

1 66. (Original) The system according to claim 56, wherein in response to a user accessing  
2 a file at a node, a replica of the file is formed at the node.

1 67. (Original) The method according to claim 56, wherein a replica is deleted by  
2 marking the replica as invalid.

1 68. (Original) The method according to claim 67, wherein said marking the replica as  
2 invalid comprises removing the backpointer for the replica.

1 69. (Original) The method according to claim 67, further comprising periodically  
2 removing replicas marked as invalid.